

REMARKS

Claims 1 and 24 have been amended. Claim 25 has been canceled. Claims 1-24 are now pending. Applicants reserve the right to pursue the original and other claims in this and other applications.

Claims 1-25 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Miyano (U.S. Patent No. 6,363,167) ("Miyano") in view of Ito (U.S. Patent No. 6,108,033) ("Ito") and Lin (U.S. Patent No. 6,292,583).

Claim 1 recites a semiconductor inspection system including a "navigation system for storing design information such as design data of a semiconductor chip and for setting, capturing and inspecting conditions including a region on a semiconductor wafer subject to inspection based on the design information" and a "scanning electron microscope system for performing actual capturing of the semiconductor wafer and for executing inspection in accordance with the capturing and inspecting conditions being set up." Further, "the navigation system sets a template comprising a bitmap based on the design information, and performs a matching process with respect to patterns within a plurality of grayscale images having an identical pattern part which are provided by the scanning electron microscope." The navigation system then "obtain[s] an image having a highest correlation value with the bitmap." According to claim 1, the "portion of the image having the highest correlation value that corresponds to the template is re-registered as a new template in place of the bitmap based on the design information." "[T]he bitmap and the new template hav[e] the identical pattern part."

Claim 24 recites a "semiconductor inspection method by which a pattern within an image provided by a scanning electron microscope is determined by using a template that is registered in advance." The method includes "creating a template comprising a bitmap based on semiconductor chip design information such as design

data" and "detecting, by a pattern matching process, positions in a plurality of grayscale images having an identical pattern part provided by the scanning electron microscope which corresponds to the template and detecting a position of an image having a highest correlation value with the bitmap among the plurality of grayscale images." The method further includes "re-registering an image portion corresponding to the detected position of the image having the highest correlation value as a new template in place of the bitmap based on the design information, the bitmap and the new template having the identical pattern part."

In the semiconductor inspection system and method of the claimed invention, a matching process is first carried out between the initial template based on CAD data and a plurality of images provided by a scanning electron microscope (SEM images). Then, the SEM image having the highest correlation value with the initial template is detected among the plurality of images given by the microscope. Next, this image (having the highest correlation value) is set up as a new template in place of the initial template. The new template is used for the matching process from then on.

The initial template is a bitmap based on the design information of a semiconductor. Using a SEM image having the highest correlation value among the plurality of SEM images obtained by the scanning electron microscope as a new template in place of the initial template allows the performance of a stable matching process with a high detection ratio. Desired SEM images are at first detected based on design data which is the initial template. The SEM data having the highest correlation value with the design data, determined from among the desired SEM images, is re-registered as a new template. It is easier to carry out the matching process between the new SEM template and SEM images than it is between the CAD design data template and the SEM images.

Miyano relates to registering, in advance, a plurality of pattern images for evaluation and comparing images actually captured by a SEM with the plurality of pattern images to judge the propriety of the plurality of pattern images and to conduct a measurement by selecting a good pattern image. The Office Action points to templates 11 and 13 of Miyano as disclosing the templates of claims 1 and 24. (Office Action, pg. 2-3). However, the templates of Miyano are made from SEM images using a scanning electron microscope on patterns actually prepared or images obtained by lithography simulation from CAD data of photomasks (reticles). (col. 4, lines 20-23). Thus, Miyano merely teaches using either a CAD simulation image or a SEM image that is irrelevant to the CAD data as the template.

Miyano does not disclose, teach, or suggest re-registering a new template that is a SEM image having the highest correlation value with an initial template derived from CAD data, in place of the initial template.

Ito relates to a system and method for monitoring a position of an object and distances which the object moves. (col. 3, lines 26-30). This is done by sequentially updating a template so as to follow the object to be monitored and thereby measure its movement. In each sequential template the object has a different shape or size in appearance and different orientation compared with the original template by virtue of the object's movement. Ito, however, only teaches updating a template between the same kinds of images captured by the same image capturing means.

Neither Miyano nor Ito discuss the difficulty of matching between different kinds of data (i.e., between CAD design data and SEM images). Therefore, even if Miyano and Ito are combinable, which Applicants do not concede, they do not disclose, teach or suggest all of the features of the claimed invention, namely, re-registering the template from the bitmap based on the design information to the SEM image having


the highest correlation value with the bitmap. The combination of Miyano and Ito would merely disclose sequentially updating design data to design data or a SEM image to a SEM image.

Lin is relied upon as disclosing an inspection system that includes a function to retrieve and store design data and for transmitting data to other SEM systems via a network. (Office Action, pg. 6-7). Lin does not remedy the above deficiencies of the Miyana and Ito combination. For at least these reasons, claims 1 and 24 are allowable over the cited combination. Claims 2-23 depend from claim 1 and are allowable along with claim 1. Claim 25 has been canceled; therefore, the rejection as to claim 25 is moot. Applicants respectfully request the rejection of claims 1-24 be withdrawn and the claims allowed.

In view of the above amendment, Applicants believe the pending application is in condition for allowance.

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